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**BEFORE THE BOARD OF PATENT APPEALS
AND INTERFERENCES**

Application Number: 10/575,342

Filing Date: April 11, 2006

Appellant(s): STUMBE ET AL.

Richard L. Treanor
For Appellant

EXAMINER'S ANSWER

This is in response to the appeal brief filed 12/06/2010 appealing from the Office action mailed 05/10/2010.

(2) Related Appeals and Interferences

The examiner is not aware of any related appeals, interferences, or judicial proceedings which will directly affect or be directly affected by or have a bearing on the Board's decision in the pending appeal.

(3) Status of Claims

The following is a list of claims that are rejected and pending in the application:

Claims pending: 1-17

Claims rejected: 1-17

(4) Status of Amendments After Final

The examiner has no comment on the appellant's statement of the status of amendments after final rejection contained in the brief.

(5) Summary of Claimed Subject Matter

The examiner has no comment on the summary of claimed subject matter contained in the brief.

(6) Grounds of Rejection to be Reviewed on Appeal

The examiner has no comment on the appellant's statement of the grounds of rejection to be reviewed on appeal. Every ground of rejection set forth in the Office action from which the appeal is taken (as modified by any advisory actions) is being maintained by the examiner except for the grounds of rejection (if any) listed under the subheading "WITHDRAWN REJECTIONS." New grounds of rejection (if any) are provided under the subheading "NEW GROUNDS OF REJECTION."

(7) Claims Appendix

The examiner has no comment on the copy of the appealed claims contained in the Appendix to the appellant's brief.

(8) Evidence Relied Upon

5,566,027	Saitoh et al	10-1996
4,983,712	Meixner et al	01-1991
WO 02/32982	Overbeek et al	4-2002
5,834,118	Ranby et al	11-1998
5,418,301	Hult et al	5-1995
6,093,777	Sorensen et al	7-2000
2007/0027269 A1	Stumber et al	2-2007
US 2010/0256255 A1	Stevens	10-2010

P.J. Flory, J. Am. Chem. Soc. (1952) Vol. 74, pp. 2718-2723.

A Sunder et al., ChemEur. J., (2000) Vol. 6, No. 14, pp. 2499-2506.

(9) Grounds of Rejection

The following ground(s) of rejection are applicable to the appealed claims:

Claim Rejections - 35 USC § 102

The following is a quotation of the appropriate paragraphs of 35 U.S.C. 102 that form the basis for the rejections under this section made in this Office action:

A person shall be entitled to a patent unless –

(b) the invention was patented or described in a printed publication in this or a foreign country or in public use or on sale in this country, more than one year prior to the date of application for patent in the United States.

Claims 1-5, 7-13, 15 and 16 are rejected under 35 U.S.C. 102(b) as being anticipated by Saitoh et al (US 5,566,027).

Saitoh discloses a photocurable resin composition comprising (A) a polyfunctional urethane modified polyester (meth) acrylate comprising a polyester oligomer and a plurality of (meth)acryloyl groups bonded to the polyester oligomer [column 2 lines 23 -28]. One example of (A) is the reaction product of trimellitic anhydride and propylene glycol subsequently reacted with isophorone diisocyanate and 2-hydroxyethyl acrylate [column 7 lines 19-23]. Polyethylene glycol mono (meth) acrylate or polypropylene glycol mono (meth) acrylate are disclosed as substitutes for 2-hydroxyethyl acrylate [column 3 lines 23-28]. Other preferred polybasic acids include phthalic anhydride, isophthalic acid, terephthalic acid, succinic acid and anhydride thereof, adipic acid [col 3 lines 1-6] and trimellitic acid (which reads on 1,2,4-benzenetricarboxylic acid) [col 2 lines 61-62]. Exemplified acids include The composition is photocurable and useful as surface resin layer of an optical lens [column 1 lines 46-50] which reads on a binder. The equivalent ratio of polybasic acid to the polyhydric alcohol is preferably 100:105 [col 3 line 66 through col 4 line 6].

Claims 1, 2, 5, 7-13 and 15-17 are rejected under 35 U.S.C. 102(b) as being anticipated by Meixner et al (US 4,983,712).

Meixner discloses polyesters which contain one or more acryloyl groups and are based on the esterification product of (a) several dicarboxylic acids and at least one trihydric saturated alcohol and (c) acrylic acid [abstract]. The inventive examples include terephthalic acid and adipic acid with a total of 2 moles of carboxylic acid functions and ethoxylated trimethylolpropane with a total of 1.5 moles of alcohol

functions [col 4 Table 1] which corresponds to a ratio of OH to COOH of 1/1.33. The trihydric saturated alcohol is preferably the ethoxylation products of glycerol, trimethylol ethane or trimethylol propane wherein the degree of ethoxylation is 3 to 6 [col 2 line 68 to col 3 line 4] from which one having ordinary skill in the art would have immediately envisaged a degree of ethoxylation of 3, 4, 5 and 6. A trimethylolpropane with degree of ethoxylation of 5 anticipates the triol of claims 16 and 17 and a glycerol anticipates the triol of claim 15. Claims 12 and 13 are anticipated because there is nothing in the claims that requires that the hyperbranched polyester is a reaction product of a diol and an at least trifunctional polycarboxylic acid. Due to the high amount of branching that will occur due to the triol, the polyester reads on hyperbranched. The polyesters can be converted into crosslinked products by radiation [col 1 lines 8-11].

Claim Rejections - 35 USC § 102/103

The following is a quotation of the appropriate paragraphs of 35 U.S.C. 102 that form the basis for the rejections under this section made in this Office action:

A person shall be entitled to a patent unless –

(b) the invention was patented or described in a printed publication in this or a foreign country or in public use or on sale in this country, more than one year prior to the date of application for patent in the United States.

The following is a quotation of 35 U.S.C. 103(a) which forms the basis for all obviousness rejections set forth in this Office action:

(a) A patent may not be obtained though the invention is not identically disclosed or described as set forth in section 102 of this title, if the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the art to which said subject matter pertains. Patentability shall not be negated by the manner in which the invention was made.

Claims 3 and 4 are rejected under 35 U.S.C. 102(b) as anticipated by or, in the alternative, under 35 U.S.C. 103(a) as obvious over Meixner et al (US 4,983,712).

While Meixner, discussed above, does not disclose the polyester prepared from the polyethylene glycol monoacrylate that is the elected species of claimed component (c), the disclosed polyester reads on all the claimed limitations of the hyperbranched polyester of the claims that is prepared from a polyethylene glycol monoacrylate.

Claims 3 and 4 are product-by-process claims, so any prior art that shows the claimed product formed by a different process will read on the claims. Since the triol of Meixner is ethoxylated, it contains polyethylene glycol units bonded between the polyester backbone and the acryloyl groups. With product-by-process claims, the methods the products are created by are not pertinent, unless applicant can show a different product is produced.

Claim Rejections - 35 USC § 103

The following is a quotation of 35 U.S.C. 103(a) which forms the basis for all obviousness rejections set forth in this Office action:

(a) A patent may not be obtained though the invention is not identically disclosed or described as set forth in section 102 of this title, if the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the art to which said subject matter pertains. Patentability shall not be negated by the manner in which the invention was made.

Claim 6 is rejected under 35 U.S.C. 103(a) as being unpatentable over Saitoh et al (US 5,566,027).

The process of instant claim 6, reacting a polyol and polyacid in the presence of (c) at least one compound having at least one ethylenically unsaturated double bond, is

not explicitly disclosed in Saitoh. However, this process is obvious over the process disclosed in Saitoh, discussed above, that reads on the process in instant claim 5. The only difference between the process of claim 6 and the disclosed process/process of claim 5 is the order of adding ingredients, i.e. adding the ethylenically unsaturated compound (c) during condensation of the polyester as opposed to after condensation of the polyester. Case law holds that the selection of any order of mixing ingredients is *prima facie* obvious. *In re Gibson*, 39 F.2d 975, 5 USPQ 230 (CCPA 1930).

Claim 6 is rejected under 35 U.S.C. 103(a) as being unpatentable over Meixner et al (US 4,983,712).

The process of instant claim 6, reacting a polyol and polyacid in the presence of (c) at least one compound having at least one ethylenically unsaturated double bond, is not explicitly disclosed in Meixner. However, this process is obvious over the process disclosed in Meixner, discussed above, that reads on the process in instant claim 5. The only difference between the process of claim 6 and the disclosed process/process of claim 5 is the order of adding ingredients, i.e. adding the ethylenically unsaturated compound (c) during condensation of the polyester as opposed to after condensation of the polyester. Case law holds that the selection of any order of mixing ingredients is *prima facie* obvious. *In re Gibson*, 39 F.2d 975, 5 USPQ 230 (CCPA 1930).

Claim 14 is rejected under 35 U.S.C. 103(a) as being unpatentable over Saitoh et al (US 5,566,027) in view of Overbeek et al (WO 02/32982).

Saitoh does not disclose polydispersity of the disclosed polyester.

Overbeek discloses crosslinkable hyperbranched macromolecules [abstract].

Overbeek teaches the polydispersity index is preferably less than 20, more preferably less than 15 and especially less than 10 [page 11 lines 18-19]. Overbeek teaches that a lower PDI for a given Mw often results in lower viscosities [page 11 lines 16-17].

It would have been obvious to one having ordinary skill in the art the time the invention was made to have prepared a hyperbranched polyester with ethylenically unsaturated groups and a polydispersity of 1.05 to 50 because Saitoh teaches that it is within the skill of the art to prepare a hyperbranched polyester with ethylenically unsaturated groups and Overbeek teaches that it is within the skill of the art to prepare a hyperbranched macromolecule with a polydispersity of 20 or less. One would have been motivated to prepare the polyester of Saitoh with the polydispersity taught in Overbeek because Overbeek teaches that the lower the polydispersity the lower the viscosity for a given molecular weight. Absent any evidence to the contrary, there would have been a reasonable expectation of success in using the polydispersity taught by Overbeek for the polyester taught by Saitoh.

Claim 14 is rejected under 35 U.S.C. 103(a) as being unpatentable over Meixner et al (US 4,983,712) in view of Overbeek et al (WO 02/32982).

Meixner does not disclose polydispersity of the disclosed polyester.

Overbeek discloses crosslinkable hyperbranched macromolecules [abstract].

Overbeek teaches the polydispersity index is preferably less than 20, more preferably

less than 15 and especially less than 10 [page 11 lines 18-19]. Overbeek teaches that a lower PDI for a given Mw often results in lower viscosities [page 11 lines 16-17].

It would have been obvious to one having ordinary skill in the art the time the invention was made to have prepared a hyperbranched polyester with ethylenically unsaturated groups and a polydispersity of 1.05 to 50 because Meixner teaches that it is within the skill of the art to prepare a hyperbranched polyester with ethylenically unsaturated groups and Overbeek teaches that it is within the skill of the art to prepare a hyperbranched macromolecule with a polydispersity of 20 or less. One would have been motivated to prepare the polyester of Meixner with the polydispersity taught in Overbeek because Overbeek teaches that the lower the polydispersity the lower the viscosity for a given molecular weight. Absent any evidence to the contrary, there would have been a reasonable expectation of success in using the polydispersity taught by Overbeek for the polyester taught by Meixner.

(10) Response to Argument

Appellants argue that "hyperbranched" polymers are polymers with a highly branched structure of extending and further branching limbs, i.e. a polymer having extensive branching on branch structure. Appellants cite several references that they believe support their definition of hyperbranched. This argument is not convincing. While Appellants' definition of a hyperbranched polymer is certainly within the scope of the broadest reasonable interpretation of the claim term "hyperbranched", it is not the only reasonable definition. Stevens (US 2010/0256255 A1), for instance, recognizes that there are "various and sometimes divergent, definitions for dendrimers and

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hydperbranched molecules" and henceforth define hyperbranched molecules as "molecules having a polydispersity greater than 1.1 and a degree of branching of from 0.25 to slightly less than 0.95, irrespective of how the molecule is synthesized" [paragraph 0018]. Furthermore, even Appellants' references do not indicate a clear definition of hyperbranched, for instance the Flory references actually refers to the polymers as "highly branched". Furthermore the hyperbranched polymers of the Sunder reference are prepared from a monofunctional and a trifunctional monomer which would not even read on the claimed "hyperbranched" polyester prepared from a difunctional and an at least trifunctional monomer. Examiner interprets "hyperbranched polyester" to mean any polyester with a high degree of branching, particularly those formed from a substantial portion of tri- or greater functional monomer.

Appellants argue that Saitoh cannot anticipate the claimed invention because the only example of Saitoh that contains a carboxylic acid - alcohol combination according to the claims has a ratio of hydroxyl group to carboxyl groups of 4, which is outside the claimed range. This argument is not convincing. Saitoh describe the equivalent ratio (i,e, ratio of moles of functional groups) of the polybasic acid to the polyhydric alcohol may preferably be in the range of 100:105-300. The resultant polyester oligomer is provided with a higher molecular weight when the ratio approaches 100:105 and a lower molecular weight when the ratio approaches 100:300 [col 4 lines 1-6]. Henceforth, Saitoh discloses a broad range of equivalent ratio but exemplifies the endpoints of the range as preferable for the control of molecular weight (low end of about 100:105 for high molecular weight and high end of about 100:300 for low molecular weight). Since

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Saitoh discloses the equivalent ratio of polybasic acid to the polyhydric alcohol is preferably 100:105 or a hydroxyl to carboxyl ratio of 1.05/1 according to the claim terminology, the range of the instant claims, 1.5:1 to 1:1.5, is anticipated by a single point (species) within the claimed range (genus).

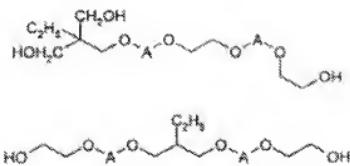
Appellants also argue that the composition of Saitoh differs from the claims because it is a polyfunctional urethane-modified polyester (meth)acrylate of a polyester oligomer. Appellants point out that Saitoh discloses a three-step reaction – first making a hydroxyl terminated polyester, then modifying it with a diisocyanate so a polyurethane will be formed, and then the polyfunctional-urethane modified polyester is reacted with (meth)acrylic acid. Appellants submit that the claims recite reacting at least one compound having at least one ethylenic double bond with **at least one hyperbranched polyester** to obtain the hyperbranched polyester comprising ethylenically unsaturated groups, wherein the at least one compound having at least one ethylenic double bond is **bonded to the hyperbranched polyester**. Thus, Appellants submit that such description requires reaction with the hyperbranched polyester and does not include reaction with a diisocyanate modified polyester as required by Saitoh (emphasis Appellants'). Appellants make analogous arguments with respect to the method claims 5 and 6. This argument is not convincing. Appellants seem to be implying that the claims require a hyperbranched polyester with unsaturated groups bonded to the polyester without any indirect linking group, but this is not what the claims say or even imply. The claims require a "hyperbranched polyester comprising ethylenically unsaturated groups" not a hyperbranched polyester without urethane groups. The

product-by-process method of claim 1 and the processes of claims 5 and 6 are also worded with comprising language. There is nothing in the claims that excludes the additional step of chain extension with a diisocyanate. In fact, Appellants specifically disclose the same chain extension with a diisocyanate when preparing the claimed hyperbranched polyester comprising ethylenically unsaturated groups [see paragraphs 0088-0092 of PGPUB US 2007/0027269 A1]. Furthermore, how do Appellants believe that the structure of Saitoh's urethane-modified polyesters differ from Appellants claimed species wherein the ethylenic groups are attached to the hyperbranched polyesters by isocyanato (meth)acrylates (claim 4 penultimate species)? Appellants specifically argue that "diisocyanates as described in Saito are not component of c) according to the invention" when in fact that very much are within the scope of "isocyanato (meth)acrylates" compounds c) of the invention of claim 4.

Appellants argue that Meixner does not disclose the claimed composition because the ratio of OH/CO₂H of polyol (including ethylene glycol and trihydric alcohol) to dicarboxylic acid is 1.95, outside of the claimed range of 1.5/1 to 1/1.5. Appellants calculate this ratio as the ratio of total OH relative to total CO₂H in the reaction mixture for the polyester. Appellants contend this is what the ratio of the claims intends and is how one having ordinary skill in the art would understand the claimed ratio. Appellants also argue that the partial OH ratio described by Examiner has no significance because it will not determine the degree of branching as Appellants interpretation of the claimed ratio would. This argument is not convincing. The ratio Appellants have calculated from the prior art polyesters is not the same as the claimed ratio. The claimed language is as

follows: ". . . a molar ratio of hydroxyl groups of the at least one at least trifunctional alcohol or at least one diol to carboxyl groups of the at least one dicarboxylic acid or at least one tricarboxylic or higher polycarboxylic acid, respectively, is from 1.5/1 to 1/1.5". Examiner interprets this language as: a molar ratio of [hydroxyl groups of the at least one at least trifunctional alcohol or at least one diol] to [carboxyl groups of the at least one dicarboxylic acid **or** at least one tricarboxylic or higher polycarboxylic acid], respectively, is from 1.5/1 to 1/1.5. The claimed ratio is dicarboxylic acid to trifunctional alcohol. The OH/CO₂H ratio of dicarboxylic acid to trifunctional alcohol in Meixner is 1.5/2 (equivalent to **1/1.33** in the claim terminology). Regarding the "significance" toward branching density, the ratio of Examiner's interpretation of the claimed ratio will certainly affect the density of branching even if Appellants' interpretation is more directly related to the density of branching. More importantly, Examiner must interpret the claims for what they say and not what the Appellants intend the claims to say. The terms in the claim are given their plain meaning by the office, and that is what has been done when comparing the claim language to Meixner.

Appellants also argue that the polyester of Meixner will not be hyperbranched as claimed. Appellants argue that because of the "extreme" amount of diol in the polyesters of Meixner, the disclosed polyester will be a completely alcohol terminated polyester with an acid number of zero or almost zero. Appellants argue that the disclosed polyester will have the following structure:



This argument is not convincing. While Appellants are correct that the intermediate polyester has a low acid number, but this does not differ from half of the embodiments of the claims. The hyperbranched polyesters of the claims may be made with a large excess of diol and Appellants do not claim any intermediate acid number. Regarding the structures above, these are merely contentions of what some of the molecules will look like. Firstly, there is a mistake in the bottom structure, a methylol group belongs in the center on the tertiary (which should be quaternary) carbon atom. Furthermore, why would a dicarboxylic acid not react with this methylol group and begin a new chain through further polycondensation. Furthermore, why would the two methylol groups at the left of the top structure not further react with a dicarboxylic each, forming branching. Appellants' contention that an excess of OH groups will predominate and not allow any polymerization and branching is not tenable given the large amount of triol in the reaction component.

Appellants also argue that Saitoh cannot read on the claimed process of claim 6 because Saitoh discloses an additional step of reacting the polyester with a diisocyanate that is not included in claim 6. Appellants also disagree with Examiner's argument that Saitoh would render the present invention obvious because "the reaction

ingredients can be added in any order". Appellants submit that reacting all the components of Saitoh would result in a polyurethane and not a polyester because the isocyanates will react with the OH groups [Examiner assumes Appellants mean "reacting all the components" means "reacting all the components simultaneously"]. This argument is not convincing. Regarding the additional step of adding a diisocyanate, there is nothing in claim 6 that excludes an additional reaction step of chain extension. As discussed above, this is disclosed in the one of Appellants examples. Regarding Appellants' contention that the ingredients cannot be added in any order in Saitoh, Examiner disagrees. The ordinarily skilled artisan can control reaction kinetics and through controlling the relative amounts of each component (i.e. choosing excess of reactive component X). Furthermore, the assumption that if all the ingredients were mixed simultaneously that only diisocyanates would react with only polyols is simply erroneous. As required by claim 6, the hydroxy functional (meth)acrylate of Saitoh (component c of the claims) would also need to be present and alcohol and carboxylic acids would certainly react as well. It would take a special effort by the ordinarily skilled artisan to mix all the components and ensure that **only** the isocyanates and polyols reacted with one another.

(11) Related Proceeding(s) Appendix

No decision rendered by a court or the Board is identified by the examiner in the Related Appeals and Interferences section of this examiner's answer.

For the above reasons, it is believed that the rejections should be sustained.

Respectfully submitted,

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